Brackishwater Culture of Tilapia in the Philippines: An Assessment

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Outline

- Introduction
- Assessment of Research and Field Trials on:
  - *Oreochromis mossambicus*
  - *O. niloticus*
  - Red Tilapia
  - *O. mossambicus x O. hornorum*
  - *O. mossambicus x O. niloticus*
  - Use of tilapia for “green water”
- Constraints to Further Development
- Recommendations

Introduction

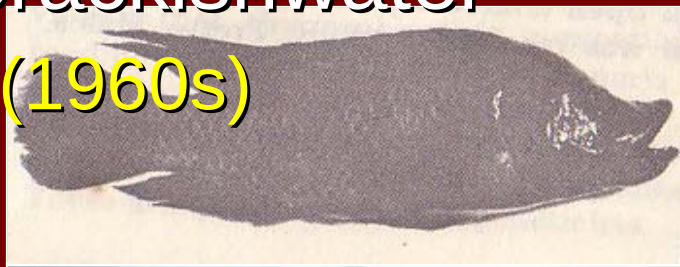
- Tilapia Production in the Philippines
  - Tilapia is second most important cultured fish next to milkfish.
  - Total tilapia production from aquaculture in 2002 was 122,315 mt.
    - 93% from freshwater ponds and cages
    - 7% from brackishwater ponds

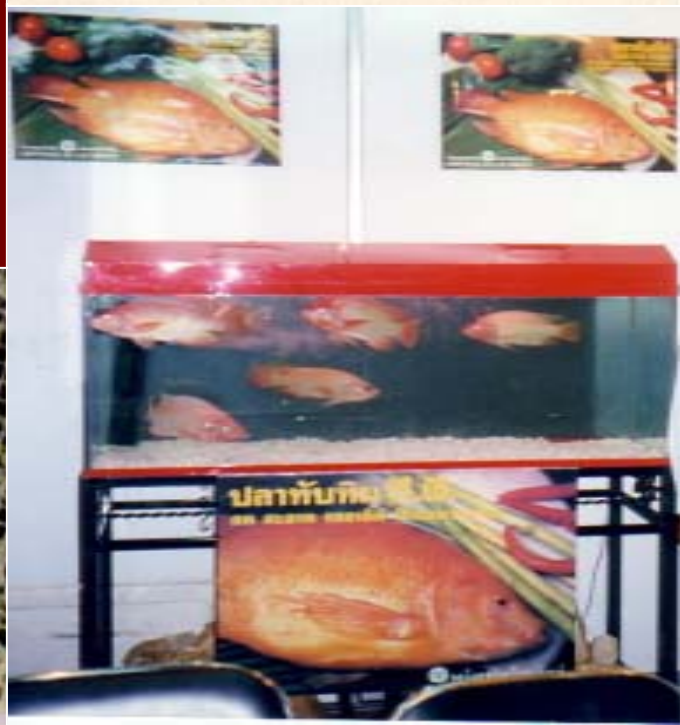
Introduction

- Brackishwater Pond Production in the Philippines (2002)
  - Milkfish - 79.5%
  - Shrimp - 15.2
  - Tilapia - 3.3
  - Other Species - 2.0

Introduction

- Tilapia production in brackishwater ponds increased by 172% from 1996 to 2002.
- Tilapia Species Cultured in Brackishwater
  - *Oreochromis mossambicus* (1960s)
  - *O. niloticus* (1970s)
  - Red Tilapia (1970s)
  - *O. hornorum* (1990s)
  - *O. spirulus* (1990s)



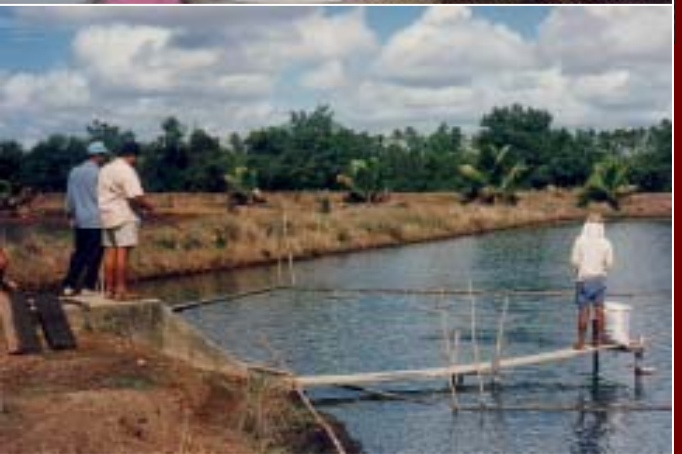


Assessment of Research and Field Trials

1960s

- Mozambique tilapia introduced for freshwater backyard culture escaped into natural waters and become established in estuaries.
- *O. mossambicus* became a “pest” by competing with milkfish in brackiswater ponds.

Assessment of Research and Field Trials



1970s

- Research on *O. mossambicus* as a cultured foodfish in 1975 at the Brackishwater Aquaculture Center of the University of the Philippines in the Visayas with the “fuel crisis” and “marine fish shortage”
- Studies on monoculture of tilapias (*O. mossambicus, O. niloticus* and red tilapia) with pond fertilization and feeding conducted
- Studies on breeding of tilapia in tanks, rearing of fry in nursery

Table 1. Experimental production data of tilapia species cultured in brackishwater ponds

Species	Salinity (ppt)	Stocking		Harvest Size (g)	Culture Period (days)	Growth Rate (g/day)	Survival (%)	Production (kg/ha)
		Density (no./m^2)	Size (g)					
O. mossambicus (manually-sexed male)	13.7-53.7	0.4	16.7	107.2	80	1.13	100	430.6
O. niloticus (mixed-sex)	14-35	1	4.1	125.5	90	1.34	82	1,005
Red Tilapia (mixed-sex)	31.5-32.1	1	8.4	179	120	1.41	82.7	1,384.9

Sources: Fortes and Villa (1975), Corre (1981) and Fortes (1987)

Assessment :

- *O. mossambicus* had the highest tolerance to salinity followed by the red tilapia (hybrid) and *O. niloticus.*
- *O. niloticus* had the best growth in brackishwater ponds followed by the red tilapia and *O. mossambicus.*
- The highest production was with red tilapia.

1990s

- Production trials by the private sector showed that sex-reversed *O. mossambicus* had good growth rate (2.2 g/day).
- Highest production was achieved with the all-male hybrid of *O. mossambicus x O. hornorum.*

Table 2. Commercial culture production data of tilapia species in brackishwater ponds

Species	Salinity (ppt)	Stocking		Harvest Size (g)	Culture Period (days)	Growth Rate (g/day)	Survival (%)	Production (kg/ha)
		Density (no./m^2)	Size (g)					
O. mossambicus (sex-reversed)	20-35	1.5	1.5	275	125	2.2	82.5	2,269[a]
O. Mossambicus x O. niloticus (sex-reversed)	25-35	1	1.5	305	182	1.7	86	6,000[b]
O. Mossambicus x. O. hornorum	22	10	1.5	300	180	1.6	80	10,000[a]

[a] With feeding only

[b] With fertilization and feeding

Sources: Corre (pers, comm
Guerrero and Cornejo (1994
Guerrero (1999)

- *Experimental cage culture of sex-reversed hybrid of O. mossambicus x O. niloticus* in a brackishwater river

Table 3. Experimental production data of hybrid tilapia cage cultured in brackishwater river

Species	Salinity (ppt)	Stocking		Harvest Size (g)	Culture Period (days)	Growth Rate (g/day)	Survival (%)	Production (kg/ha)
		Density (no./m^2)	Size (g)					
O. Mossambicus x. O. niloticus [a]	15-30	200	5	186	108	1.7	86	32
O. Mossambicus x. O. niloticus [b]	28	200	24	317	103	2.8	80	63

a Iloilo strain
b Laguna Strain

Source: Dureza *et. al.* (1994)

Assessment :

Cage trials showed potential for commercial culture.

- Use of Tilapia for “Green Water” in Shrimp Culture
  - For control of vibriosis disease of *Penaeus monodon* in brackishwater ponds
  - Culture of tilapia hybrids (e.g., red tilapia, *O. mossambicus x O. niloticus* and *O. mossambicus x O. hornorum* in cages within the pond or in separate ponds

  - “Manuring effect” induces phytoplankton bloom of beneficial green algae like *Chlorella* that suppresses luminous bacteria (e.g., *Vibrio harveyi*)

Constraints To Further Development

- Lack of salt-tolerant tilapia fingerlings for commercial production in brackishwater ponds and cages
- Inadequate extension services for dissemination of technologies
- Apprehension of environmentalists that tilapia hybrids “can possibly” invade marine ecosystems

Recommendations

- Setting up of more commercial hatcheries for production of salt-tolerant tilapia fingerlings in areas where brackishwater ponds are not fully utilized

Recommendations

- Beefing up of extension services through training of extension workers and field demonstrations for fish-farmers

Recommendations

- There is little or no possibility that tilapia hybrids produced through conventional methods will “invade” marine ecosystems such as coral reef and sea grass beds.
  - There is a tilapia-like marine fish that is caught in the sea.

  - Tilapias are lacustrine (lake-dwelling) species and have low survival in the open sea.

Mabuhay!